

# Obstetrical Care and Social Patterns in Metropolitan Boston

DEREK ROBINSON, M.D., D.P.H.

THE RELATIVELY unfavorable position of the United States and its North American neighbors in the international trends of infant and maternal mortality is resulting in the appraisal of habits and standards of medical care and in the potentially adverse influence of socioeconomic patterns. In other countries, favorable mortality and morbidity experiences are modified by socioeconomic influences so that the true effects of differing methods of obstetrical practice in the general care of the patient and in the selective use of special technical and manpower facilities are obscured. Within the United States proper, it is desirable to break down the peculiar adversities to assess, unbiased by chance associations, the true risks in obstetrical practices and to establish directions for correction.

## Objective

Reliable information is the prerequisite for valid analysis. Such information should include basic demographic material providing the indexes of population restlessness and mobility, origins and ethnic characteristics, innate or learned resourcefulness, personal and family resources, and community response in effectively

matching resource with need. To the mother's age and parity, precedent history, and prenatal care, and to the conditions of gestation and delivery must be added the continuity and quality of medical supervision and the ability of the physical and personnel resources to meet unexpected adverse factors occurring during the childbearing period.

One of the formidable obstacles to valid conclusions can be failure to obtain complete participation of the study group. Reasons for such failure include the reluctance of some patients and physicians to allow scrutiny of their lives and practices, the limited recording of medical information within some patterns of care, and the protection of confidentiality in some high-risk social situations.

One answer to the need for universal participation is the birth certificate. Local statutes and customs determine information sought on these documents. Generally, they provide an accurate record of parental residence and origin and some identifying material such as age and ethnic status. With less certainty they provide information on family size and plurality, previous natal history and present birth complications, weight of the baby, place of birth, and name of the attending physician. Osterud and associates (1) have shown that as sources of medical information birth certificates are imperfect. However, Bell (2), in Vermont, found greater reliability when the sought-for abnormality was gross, and Bergstrom (3), also in

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*Dr. Robinson, at the time of this study, was research associate in maternal and child health, Harvard University School of Public Health, Boston. He is now assistant director in the division of adult health, Massachusetts Department of Public Health, Boston.*

Vermont, demonstrated the validity of forecasts of postnatal risk based on prenatal information recorded on birth certificates.

### Method

In Massachusetts the birth certificate is a relatively simple document. In addition to routine questions the State requires parental identifying origins, married and maiden names of the mother, and ages, residence, and ethnic group of the parents. Several questions are asked concerning size of family and place and supervision of birth. Much of the information contained in the recommended standard certificates described by Colby (4) is not available. However, study of the Massachusetts documents revealed pertinent information on population shifts, some medical care characteristics of the different community sections, the various obstetrical care units, and the physicians supervising the childbirth.

It is also possible to make some assumptions on the mother's marital status at the time of birth. The presence on the certificate of the name of the father, matching the family name and the residential address of the mother, is not proof that the child was born into a normal family situation. The reverse finding, absence of the father's name or a difference in family name and residence clearly indicates a maritally abnormal situation. Generally, such births may be termed "out of wedlock," or the mother may be described as unmarried. These births

are easily identifiable on certificates filed for live births, but identification is not synonymous with the detection of illegitimacy.

This particular report is concerned with the certificates of 24,460 live infants born in the city of Boston in 1962. In that year, 13 hospitals in the city provided the major part of childbirth care for the metropolitan area, and the certificate of each live birth was filed with the city registrar in random order of receipt. In the same year, only 30 or so births occurred outside the obstetrical units, usually in the mother's home.

All the birth certificates were examined, and material from each 10th certificate and from each certificate indicating a maritally abnormal situation was entered directly onto a pre-coded sheet. If the 10th certificate indicated marital abnormality, the next "normal" record was extracted in its place. A total of 2,445 maritally normal and 1,791 presumptive out-of-wedlock births were coded. The control sample thus contained a weighted 10 percent sample of the live birth population, biased by the exclusion of marital abnormality.

### Results

*Population trends.* Almost half of the babies born in the city, in or out of wedlock, had mothers who were not residents of Boston. Of the married fathers, half had migrated at some time into the metropolitan area and 18.1 per-

**Table 1. Origin, residence, and net in-migration of fathers, in percent, Boston, 1962**

Geographic area	Married fathers			Putative fathers		
	Origin (N=2,445)	Residence (N=2,445)	Inflow	Origin (N=81)	Residence (N=22)	Inflow
Boston city.....	44.6	52.3	7.7	27.2	59.1	31.9
Boston suburbs.....	13.9	29.5	15.6	13.6	27.3	13.7
Massachusetts.....	8.8	17.2	8.4	13.6	4.5	9.1
New England.....	4.5	.7	3.8	8.7	4.5	4.2
Remainder of United States.....	18.1	.2	17.9	32.1	4.5	27.6
Puerto Rico.....	.7	-----	.7	1.2	-----	1.2
Foreign.....	9.3	-----	9.3	3.7	-----	3.7
Not traced.....	-----	.1	-----	-----	-----	-----
Total.....	99.9	100.0	-----	100.1	99.9	-----

SOURCE: Metropolitan area (Boston city and suburbs) was arbitrarily defined as in studies of the United Communities Services for Greater Boston, which included the city of Boston and the surrounding major suburban cities and towns.

**Table 2. Maternal age, marital status of projected population, and ethnic status of survey population, Boston, 1962**

Age	Projected population			Survey population			
	Total number	Percent married	Percent unmarried	Total number	Percent white	Percent Negro	Percent other
10-14-----	48	41.7	58.3	30	50.0	46.7	3.3
15-19-----	2,213	69.1	31.2	843	71.3	27.8	.8
20-24-----	8,010	97.7	8.3	1,400	79.0	20.1	.9
25-29-----	7,337	96.9	3.1	940	84.5	14.6	1.0
30-34-----	4,836	97.7	2.3	585	86.8	12.0	1.2
35-39-----	2,896	98.3	1.7	335	89.3	10.1	.6
40-44-----	728	97.3	2.7	91	92.3	6.6	1.1
45-49-----	61	98.4	1.6	7	85.7	14.3	-----
Total-----	<sup>1</sup> 26,129	93.1	6.9	<sup>2</sup> 4,231	80.7	18.4	.9

<sup>1</sup> Projected population larger than real population.

<sup>2</sup> Excludes 5 sets of illegitimate twins.

cent still lived outside the area. Net inward family migration was reflected in an additional 8.4 percent of fathers living in outer Massachusetts, 15.6 percent in the suburbs of Boston, and 7.7 percent in the city (table 1), whose wives had used Boston's obstetrical facilities. The main sources of this population were net additions of 17.9 percent from the remainder of the United States and 10.1 percent from overseas.

Of the limited number of known putative fathers, only 27.2 percent were born in the city, with an additional net in-migration of 31.9 percent. The United States was the source of one-third of the remaining putative fathers.

These figures reflect significantly the extent of population restlessness and underscore the difficulties experienced by medical and social agencies in case and information finding. They also represent to the family potential difficulties in obtaining continued service in a strange environment with unfamiliar local resources and in the absence of help from friends or near relatives.

The marital status of mothers varied considerably with age differences (table 2). The younger age groups accounted for most out-of-wedlock births. An estimated 31.4 percent of the mothers under 20 years of age were unmarried, and even though teenagers accounted for only 8.6 percent of all births, they were responsible for 39.7 percent of those out of wedlock. Table 2 shows the findings concerning the survey group projected to the total population.

The figures in the preceding paragraph, for example, and elsewhere in the paper were obtained by combining the projected population age groups shown in table 2; that is, 2,213 + 48 = 2,261 births to mothers under 20 equals 8.6 percent of all 26,129 theoretical births—a necessary statistical correction in the original sampling technique. The 31.4 percent of unmarried teenagers are the 712 teenagers in the total projected 2,261 teenage mothers, and these 712 represent 39.7 percent of all 1,791 known unmarrieds.

Though Wallace (5) has pointed out the increased medical risk attendant to the babies of teenage mothers, there was, disregarding mild toxemia, less agreement on the risk to the mother by reason of youth. Stearns (6) found no increased risk of complication in pregnant adolescents. Earlier, Nokes and associates (7) had found no disadvantage in youthful as against older primiparas; and Marchetti and Menaker (8), in dealing with adolescent primiparas, concluded that 16 years was the optimum age for childbirth so far as the mother was concerned. Similarly, Santow (9), dealing with 170 unmarried Australian girls 13 to 15 years of age, found little evidence that the chronologic age of the parturient patient influenced pregnancy. The predominance of out-of-wedlock births among the youngest mothers is not new nor confined to the Boston area. For England and Wales in 1961 the Registrar General (10) calculated that two of every three babies

born to teenage mothers were conceived out of wedlock.

The social implications of a continuing high proportion of teenage pregnancies include the educational deprivation of a sizable number of pregnant girls, possibly because of exclusion from the school system. Labrack (11) has shown in Maine that a high proportion of unmarried mothers are under 15 years of age. In this Boston survey, girls under 15 accounted for 1.6 percent of the unmarried mothers. Assumptions derived from the 10 percent sample indicated about 48 births occurring annually in Boston to girls under 15 years of age, although according to the birth certificates more than 40 percent claimed to be married at the time of birth.

A hypothesis drawn from the Manchester study by Anderson and co-workers (12) was that most extramarital pregnancies resulted from normal adolescent practices in the female's choice of the male and not from promiscuity. The educational deprivation inevitably resulting from youthful pregnancy might be significant in the subsequent course of motherhood if the adolescent kept her baby, or in the course of her social rehabilitation if she did not.

Ethnic factors were significant in the incidence of teenage pregnancy. About twice the number of Negro as non-Negro mothers were under 20 years of age, regardless of marital status. The younger a mother was, the more likely she was to be Negro. Conversely, white fertility rates were higher than Negro after the age of 24. Higher teenage-specific fertility rates for Negroes have been similarly reported by Stine and associates (13) and associated with higher neonatal death rates in the babies of young Negro mothers. If the population of metropolitan Boston is not further affected by mass in-migration, the passing postwar bulge of adolescents could result, over the next few years, in a decreasing proportion of Negro births and a rising birth rate for the more mature white females.

The increased fertility of Negro women in younger age groups, dissociated from marital status, allays some of the suspicion raised by Aznar and Bennett (14) that adolescent Negro out-of-wedlock births are comparatively exaggerated by concealment of pregnancies of white

adolescents through the euphemistic description of their marital status as "separated." While some such tendency may exist, it would appear from the Boston study that ethnic age-specific illegitimacy rates are primarily related to total age-specific fertility characteristics rather than to marital differences. The ethnic group-specific rates for out-of-wedlock pregnancy among white women were 5.4 percent and among Negro women, 18.4 percent.

The overall rate of 6.9 percent for out-of-wedlock confinements coincided with the rate for city residents. The lower rates for suburban women were balanced by a high incidence of extramarital pregnancy among the women coming into the city from other New England States to have their babies. As many as 43.9 percent of these mothers were unmarried.

Tabulation of marital status by the place where the mother was born further emphasized the excessive contribution made by in-migration to the rates of out-of-wedlock pregnancy. For white mothers born in the city of Boston, the out-of-wedlock pregnancy rate was 3.0 percent compared with the 5.4 percent for all births of white babies. Moreover, for women born in the metropolitan suburbs the out-of-wedlock pregnancy rate was 5.9 percent, a figure possibly biased by social selection of the place of confinement, but also possibly related to the findings of Goldstein and Mayer (15) in nearby Rhode Island, where some age-specific illegitimacy rates were higher in youthful suburban groups matched with those in the city.

In the Boston study, the apparently higher suburban rates for out-of-wedlock confinements did not necessarily indicate higher rates of extramarital conception among suburban-born women, but rather that suburban girls conceiving out of wedlock were perhaps more likely to turn to the facilities within the city than were their married suburban neighbors. The higher suburban rates were significant in showing how the incidence of social disadvantages in the suburbs could be obscured by the outward migration of essentially conventional families.

The attraction to central facilities of pregnant girls with added social adversities was further confirmed by the tendency of the unmarried girls from the remainder of Massachusetts to seek care at the center of the metropolitan area.

Of these Massachusetts mothers, 14.6 percent were unmarried.

That inward migration toward the city is also characteristic of the Negro groups is shown by the proportions of married (64.2 percent) and unmarried (65.0 percent) Negro mothers who had migrated from outside the New England States. In-migration was not as specifically associated with out-of-wedlock pregnancy in the Negro as in the white mothers. Since Negro rates of illegitimacy were largely unrelated to the origin of the mother, the association of high rates of Negro extramarital pregnancy with inward migration was a chance one.

*The family.* Only limited conclusions can be drawn from information, sometimes not supplied though requested, on the original certificates of birth. Mean family size was not materially influenced by ethnic factors, though for Negro women, married or unmarried, there were fewer primiparas than expected and an excess of large families. The inference of more out-of-wedlock pregnancy repeaters in Negro girls agrees with the more positive findings of Pakter and co-workers (16) in New York. Among the Boston mothers, however, the final extramarital family size of repeaters was not materially influenced by the ethnic origin of the mother.

*Infant birth weight and parity.* The mean birth weight for the series was 6.9 pounds, and 9.7 percent of the infants weighed less than 5.5 pounds. There was no information on length of gestation. Though extremes of low birth weight tended to be associated with primigravidas and extremes of high birth weight with grand multiparas, there was no evidence that parity materially affected mean birth weights.

*Infant birth weight, marital status, and ethnic group.* Some apparent association existed between birth weight and marital status, with means of 7.1 pounds for married and 6.7 pounds for out-of-wedlock births. Differences lay in the proportions of small babies with birth weights under 5.5 pounds for 7.8 percent of the married and 12.3 percent of the out-of-wedlock groups. A similar apparent association of mean birth weight with ethnic groups was expressed by the mean weight of 7.0 pounds for white infants and 6.5 pounds for Negro infants.

*Infant birth weight and origin.* The place of origin of the mother did not materially affect

the likely weight of her baby. An excess of low birth weights for the infants of U.S. in-migrating mothers and of high birth weights for the infants of foreign-born immigrant mothers was probably related to other factors. Some excess of small babies of nonmetropolitan mothers was probably a result of special selective procedures in predetermined complicated pregnancies. It was interesting to note that of mothers born in the city those who subsequently moved to the suburbs tended to have heavier babies than those who remained in the city. By residence alone, suburban mothers tended to bear the heaviest infants.

*Infant birth weight and mother's age.* According to Clough (17), ethnic differences in mean birth weight are not related to differences in length of gestation. Bruns and Cooper (18) concluded that prematurity was an ethnic hazard and, like Parmelee (19), that it was not as such associated with illegitimacy. There was disagreement, however, about the influence of the mother's age on the weight of her infant. While Clough found no evidence of association, Bruns and Cooper regarded extremes of birth weight as factors associated with extremes of maternal age.

Table 3 shows the mean birth weights by age group of the mothers in this series. Even allowing for the excess of Negro mothers in the younger age groups, there appears to be a linear increase of weight with maternal age, from which it has already been suggested that factors of parity and marital status can be excluded. Differences in mean birth weights by tabulation

**Table 3. Maternal age and mean birth weight, Boston, 1962**

Age group (years)	Total number of births	Mean birth weight (pounds)
10-14	30	6.48
15-19	843	6.75
20-24	1,400	6.86
25-29	940	7.03
30-34	585	7.09
35-39	335	7.06
40-44	91	7.11
45-49	7	8.14
Total	<sup>1</sup> 4,231	6.93

<sup>1</sup> Excludes 5 sets of illegitimate twins.

against specific factors in the series could be almost wholly explained by the differences in mean maternal age. Differences ranged from the mean of 6.5 pounds for teenage mothers to 8.1 pounds for mothers over 44 years of age.

*Place of delivery.* Well-defined social trends influenced the distribution of mothers among the 13 hospital obstetrical units in the city. Older women tended to be confined in the smaller proprietary units, though the multivariate statistical approach of Feldstein and Butler (20) to the original perinatal mortality findings of Butler and Bonham (21) has shown the increasingly specific risks of advancing maternal age. Conversely, almost all confinements of white teenagers, regardless of marital status, occurred in the city hospital or in a large central teaching unit. A small number occurred in one of the sectarian hospitals.

Confinements of Negro teenagers were highly concentrated at the city hospital. The confinements of married Negroes were a little more "widely spread." They also used two small central teaching units. These units, handling most of the Negro births, also assumed the main burden of out-of-wedlock pregnancies, though a considerable proportion of white unmarried mothers were cared for at a large teaching unit and at one of the sectarian hospitals.

Thus the traditional at-risk groups were concentrated, though unequally, at 5 of the 13 available obstetrical units. The social factors of selection were not merely chance adjacency. The same units, except the city hospital, were used by corresponding social groups from outside the metropolitan area. Conversely, the voluntary religious-affiliated and the proprietary hospitals tended to practice exclusively among white suburban married women.

The significance of these tabulations lies in possible discrepancies between the investment of medical resources and the availability of these resources to the higher risk groups. Central units with limited resources tended to be overloaded with multiproblem, high-risk confinements. The achievements of the different obstetrical units and the efforts demanded of their staffs need to be examined against the different characteristics of the populations they serve. The disposition of out-of-town, high-risk mothers would indicate that geographic factors

alone do not explain the role of different community voluntary hospitals nor of the small proprietary hospitals, where presumably limited facilities bore the attendant risks of confinement of the oldest groups of mothers.

*Attendant at birth.* At 12 of the 13 hospital obstetrical units, the certificate item concerned with the name of the physician in attendance at the birth was accurately completed. From each of the signatures the identity of the physician was established as well as his official position, training, and professional qualifications. The one exception was the unit at the city hospital where the attending physicians were not identified. These findings are thus inevitably biased by loss of information on a large proportion of the Negro and at-risk social groups. A pilot study of birth records at the city hospital indicated that the overwhelming proportion of lost births were attended by residents, interns, and medical students.

For the remaining 3,040 births in the married and unmarried groups, 396 physicians were identified, with an annual case rate of 7.7—a considerable arithmetic understatement. Excluding deliveries by busy obstetricians would leave many physicians with presumably only occasional obstetrical experience.

Projected to the general population, 32.4 percent of the deliveries (table 4) were performed by board-certified obstetricians, 18.0 percent by physicians mainly practicing obstetrics, 11.5 percent by general medical practitioners, and 18.2 percent by hospital residents and interns. Considerable variation occurred in the annual delivery rate per physician that was not directly calculable but could be expressed as the known sample ratio of 10.6 by certified obstetricians, 10.8 by their noncertified colleagues, 3.4 by general medical practitioners, and 7.5 by each hospital resident and intern.

The medical experience was distributed unevenly. While married white women, with 83.0 percent of the projected births, had 97.5 percent of the attention of board-certified obstetricians, their unmarried white contemporaries, with 4.7 percent of the births, had 1.0 percent of the specialists' care. Married Negro women, with 9.3 percent of the births, had 1.2 percent, and their unmarried contemporaries, with 2.0 percent of the births, had 0.03 percent of the specialists' at-

**Table 4. Effect of maternal status as related to status of attending physician, Boston, 1962**

Attendant status	Projected total births (percent)	Percent married		Percent unmarried		Total case ratio (percent)	Practitioner's annual caseload
		White	Negro	White	Negro		
Certified obstetrician.....	32.4	97.5	1.2	1.0	0.03	99.7	10.6
Obstetrician.....	18.0	93.1	2.3	3.8	.3	99.5	10.8
General practitioner.....	11.5	93.4	3.3	1.2	.1	98.0	3.4
Residents and interns.....	18.2	75.5	7.7	13.6	1.4	98.2	7.5
Unspecified.....	16.2	43.1	40.0	4.8	10.5	98.4	-----
Unknown.....	3.8	85.9	5.1	8.3	.7	100.0	-----
Total births.....	100.1	83.0	9.3	4.7	2.0	98.0	-----

tention. Conversely, even excluding the city hospital, the majority of unmarried white women depended largely on hospital interns and residents, while few Negro women, regardless of their marital status, were cared for by obstetricians, board certified or otherwise.

Significantly, obstetricians, especially the board certified, tended to practice exclusively among white, married, suburban women. Less affluent families depended heavily on general practitioners, whose patients perhaps tended to have more socioeconomic problems than those of their specialist colleagues. The youngest mothers, the primigravidas, the Negroes, and those with at least the social problems of illegitimacy were squeezed into limited clinics and social-work resources under the care of presumably less-experienced and discontinuous hospital residents.

It is against the background of such a socially determined distribution of medical resources, tending to be inversely related to medical and social needs, that the mortality and morbidity experience of both hospital units and social groups must be studied. It is only by eliminating the biasing factors of different medical care standards that the true risks traditionally associated with particular groups can be assessed. It appears not unlikely that the disparity between medical need and available medical care lies at the root of the increasingly adverse experience of the United States in the international trends of infant and maternal mortality.

**Discussion**

The constant reexamination of patterns of obstetrical care is stimulated by statistics on maternal and infant mortality. Factors associated

by chance with adverse experience need to be set aside from true causes. It is no longer sufficient to assert that illegitimacy is a precursor of high infant mortality or that deficiencies in prenatal care result in high maternal mortality in the lower socioeconomic groups. Long-accepted concepts can be challenged only through careful analysis of procedures and records and the dissociation of biasing factors.

Shwartz and Vinyard (22) could find no causal relation between prenatal care and either related pregnancy disasters leading to early termination or prevention of fetal and neonatal mortality. On prematurity, Grunewald (23) has shown that low birth weight is not necessarily associated with a short gestation period—the true antecedent to high rates of neonatal death. High neonatal death rates have been reported by Moriyama (24) to be the primary statistical factor underlying the apparently adverse international experience of the United States in providing effective, safe care to its childbearing population.

Not all this adversity can be accredited to the statistically poor experience of Negro mothers and babies. Multiple causes may be lying in the general way of life in community, educational, and social factors; in the medical supervision of the pre- and post-natal periods; and in the conduct of labor itself. Hobbs and Acheson (25) recently showed that even with the elimination of biasing factors, the eventual outcome of obstetrical care, judged by perinatal mortality, is still related in part to the obstetrical efficiency and experience of the physician in attendance.

This study of births in the city of Boston revealed a wide variation in obstetrical experi-

ences between the different socioeconomic groups. Hospital resources were not evenly spread among groups of pregnant women, and a small proportion of the clinical and social-work facilities had to bear the channeling of most problem mothers into their limited resources. Similarly, the groups of women with the worst records of mortality and morbidity received less benefit from the large local resource of highly trained obstetricians. Mothers from less affluent families still depended, to a large extent, on general medical practitioners with a small annual obstetrical caseload and with presumably limited hospital access, while the youngest girls with the most problems and the least resources relied on the impersonal clinics and the discontinuous care of hospital residents and interns.

The obstetrical resources of the city are also seen to be under considerable pressure from the inflow of high-risk pregnant women. The farther a mother traveled to seek obstetrical care, the more likely she was to be socially distressed. After being discharged, she and her baby presumably would be lost to further supervision. The core city itself gave rise to only a small proportion of the problem confinements. Within the metropolitan area as a whole, an extraordinary degree of population restlessness had left the overwhelming proportion of women potentially isolated, within their pregnancy, from familiar local resources and from the support of near relatives.

The inward movement of large numbers of Negro women from distant areas had added an unusually large load to the social confusion. While illegitimacy occurred most frequently among Negro teenagers, the association was partly a chance one, not associated with immigration but primarily with higher teenage-specific Negro fertility rates, basically different family patterns, and higher rates of repeated extramarital pregnancy. Moreover, the young Negro mothers tended to bear the lightest and most frequently the premature babies, presumably requiring the greatest investment of medical care.

Insofar as birth weight could be considered an index of the outcome of pregnancy, its variations from the mean appeared to be determined more by the mother's age than by her ethnic,

marital, or parity status. It also appeared likely that the more affluent families, by their nature more likely to be maritally conventional, had heavier babies and, by moving into the suburbs, they obscured the true indexes of suburban out-of-wedlock births. Suburban illegitimacy was generally not high, but if those who in-migrated were excluded it was found to be much higher. The overall optimistic pattern presented by the suburbs was due to the new suburban families who, as expected, tended to be successful and conventional, which statistically hid the problems of the long-time suburban residents.

### Conclusion

Obstetrical practices in metropolitan Boston have been concerned with an increasingly migratory population. Extramarital pregnancies, uncommon in stable city-core families, are much more common in women moving into the center city, either temporarily or permanently; and the rate is increased by the double factors of high incidence among teenagers and high fertility rates among Negro girls. Community trends of extramarital conception could change as the expanded postwar population ages.

While some of the weight and prematurity differences ascribed to socioeconomic factors were ethnically determined, most of the differences in the mean weights of infants were related to maternal age. Socioeconomic and ethnic factors and, to a lesser extent, geographic proximity determined the availability of hospital facilities and supervising medical personnel. Biasing factors associated with mothers in social adversity included increased medical risks to the smaller infants of teenage girls, especially Negro mothers, and the unequal opportunities of the different socioeconomic and parity groups in the use of the available obstetrical resources.

Additional social risks included the high mobility of the population and the separation of childbearing women, of whatever marital status, from community resources with which they were familiar and from the support of their relatives. To the restless metropolitan community was added the considerable inflow of already pregnant, disadvantaged, and resourceless girls. The core city, rather than giving rise to such abnormal situations, inherited most of them from

surrounding or distant communities. One can appreciate from these findings the extent of the indebtedness of suburban and rural populations to the communities and resources of the metropolitan core.

### Summary

Data were extracted from 2,445 birth certificates filed in Boston in 1962 for 10 percent of the infant population restricted to maritally normal families and for all 1,791 out-of-wedlock births.

The extensive inward movement of families to the metropolitan area emphasized the importance of the city as a resource of obstetrical services to residents of the whole New England area. More than one-fourth of the married fathers and one-third of the 81 putative fathers originated outside the New England area. The inward movement of foreign immigrants was an additional important source of population and provided the highest proportion of normal family groups and the largest babies. Immigration of persons from the remainder of the United States provided a preponderant part of the unstable, socially disadvantaged population and produced the smallest babies. Immigration also accounted for most of the Negro mothers, with 64.2 percent of the wedlock and 65.0 percent of the out-of-wedlock Negro births.

Out-of-wedlock births occurred most frequently in the youngest mothers. About half of the teenage mothers resident in the city were not married to the infant's father at the time of confinement. For both married and unmarried women, teenage-specific fertility rates were much higher for Negro than white girls; yet after the age of 24, Negro age-specific fertility rates declined more rapidly than those in other groups.

In-migrating Negro women were no more likely to experience out-of-wedlock pregnancy than Negro girls born in the city. However, an unduly large proportion of nonresident, non-Negro women seeking care in the city were unmarried. New white and Negro residents to the area contributed an unduly large proportion of the out-of-wedlock births. For city-born and resident white women the out-of-wedlock birth rate was 3.0 percent, and for their suburban counterparts, 5.9 percent; while for city-

born and resident Negro women, it was 17.0 percent.

Birth weight was not materially influenced by the mother's parity. Out-of-wedlock babies tended to be lighter and twice as frequently premature as babies in the married group, but ethnic differences were prime determinants since Negro babies tended to be lighter anyway. Many of the weight-associated characteristics (mother's origin and marital and ethnic status) were really expressions of mean maternal age biases. Graduated increases of 6.5 pounds in the youngest mothers to 8.1 pounds in the oldest occurred in mean birth weights.

There was considerable disparity in the use of particular hospital facilities by different social, economic, and ethnic groups. Virtually all types of problems that were likely to complicate the outcome of pregnancies were channeled into 5 of the 13 hospitals in the city of Boston, with a special concentration into 1 unit. Not all of this concentration could be ascribed to geographic convenience.

Examination of the qualifications and experience of the physicians attending the 3,040 births for which identification of the attendant was possible revealed that physician coverage was primarily determined by socioeconomic and ethnic group. While board-certified obstetricians tended to practice among white, married, suburban women, less affluent white families depended on general medical practitioners with less obstetrical experience. The unmarried white girls and almost all the Negro women depended primarily on hospital interns and residents, who cared for the youngest, the primigravidas, and those with acute social problems that were likely to affect the course and outcome of their pregnancies.

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## **Computers to Identify Vacant Hospital Beds**

The Public Health Service has contracted for the development and testing of a computer system designed to identify all vacant hospital beds in a community and predict their future availability. The system is similar to that used by airlines to handle reservations.

The 18-month, \$185,000, project will be carried out by the Institute of Medical Sciences of the Presbyterian Hospital and Medical Center in San Francisco.

Medicare is expected to increase the demand for hospital beds by about 5 percent nationally, considering patients of all ages. The new health insurance program has also underlined the need for efficient methods of determining the availability of beds in communities.

The first 12 months will be spent in planning, organizing, and engineering the system within the 240-bed Presbyterian Hospital. The final 6 months will be devoted to testing the operation of the system, with data fed to a central computer outside the hospital, rented on a time-sharing basis. Eventually all hospitals in the area could rent time on this computer, creating a source of communitywide information on bed availability.